

**WHAT IS CLAIMED IS:**

1. An electric motor apparatus comprising:
  - an electric motor having a rotor and a stator;
  - a driving circuit;
  - 5 a controller controlling said driving circuit including first driving circuit and second driving circuit; and
  - spiral wires mounted on said stator of said electric motor to be scattered peripherally and energized to rotate said rotor of said electric motor, said spiral wires being classified into two groups of first system and second system.
- 10 2. An electric motor apparatus according to Claim 1, wherein
  - said energized spiral wires rotate said rotor by at least one of said two groups of said spiral wires for said first system and said second system in normal condition; and
  - 15 said controller controls said driving circuits to rotate said rotor by only one of two groups of said spiral wires where the other remaining group of said spiral wires is in abnormal condition.
- 20 3. An electric motor apparatus according to Claim 2, wherein
  - said energized spiral wires rotate said rotor by a cooperation of said two groups of said spiral wires for said first system and said second system in normal condition.
- 25 4. An electric motor apparatus according to Claim 3, wherein
  - said electric motor is an alternating current motor changing a phase of a current supplied to said spiral wires of said first system and said second system according to a position of said rotor; and
  - said electric motor apparatus provides one position sensor detecting said position of said rotor and being shared by said first system and said second system.

5. An electric motor apparatus according to any one of Claims 1 to 4, wherein each of said spiral wires for said first system and said second system is disposed one by the other alternatively; and

5 said controller controls each of said first driving circuit and said second driving circuit to shift the current phase of spiral wires on neighboring teeth in said first system and said second system at an angle corresponding to an angle distance of said neighboring teeth.

6. A power steering system including said electric motor apparatus according to Claim 5, comprising:

10 a steering wheel for a vehicle; and  
a steered wheel separated mechanically from said steering wheel, wherein said electric motor apparatus controls to position a steered angle of said steered wheel on a basis of a steering angle of said steering wheel.

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7. An electric motor apparatus comprising:

an electric motor having a rotor and a stator;  
a driving circuit;  
a controller controlling said driving circuit including first driving circuit and  
20 second driving circuit;

spiral wires mounted on said stator of said electric motor to be scattered peripherally and energized to rotate said rotor of said electric motor, said spiral wires being classified into two groups of first system and second system;

25 said electric motor is an alternating current motor changing a phase of a current supplied to said spiral wires for said first system and said second system according to a position of said rotor;

one position sensor for said first system; and  
the other position sensor for said second system, wherein

said energized spiral wires rotate said rotor by a cooperation of said spiral wires for said first system and said second system on a basis of each of said position sensors respectively in normal condition; and

5        said controller controls said driving circuits to rotate said rotor by one of or both of said first system and said second system on a basis of the other remaining position sensor where one of said position sensors is in abnormal condition.

8.    A power steering system including said electric motor apparatus according to Claim 7, comprising:

10        a steering wheel for a vehicle; and  
         a steered wheel separated mechanically from said steering wheel, wherein  
         said electric motor apparatus controls to position a steered angle of said steered wheel on a basis of a steering angle of said steering wheel.